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EPA Science Forum: Collaborative Science for Environmental Solutions

Importance of EPA Ecosystem Research to Environmental Management Programs in Baltimore County, MD

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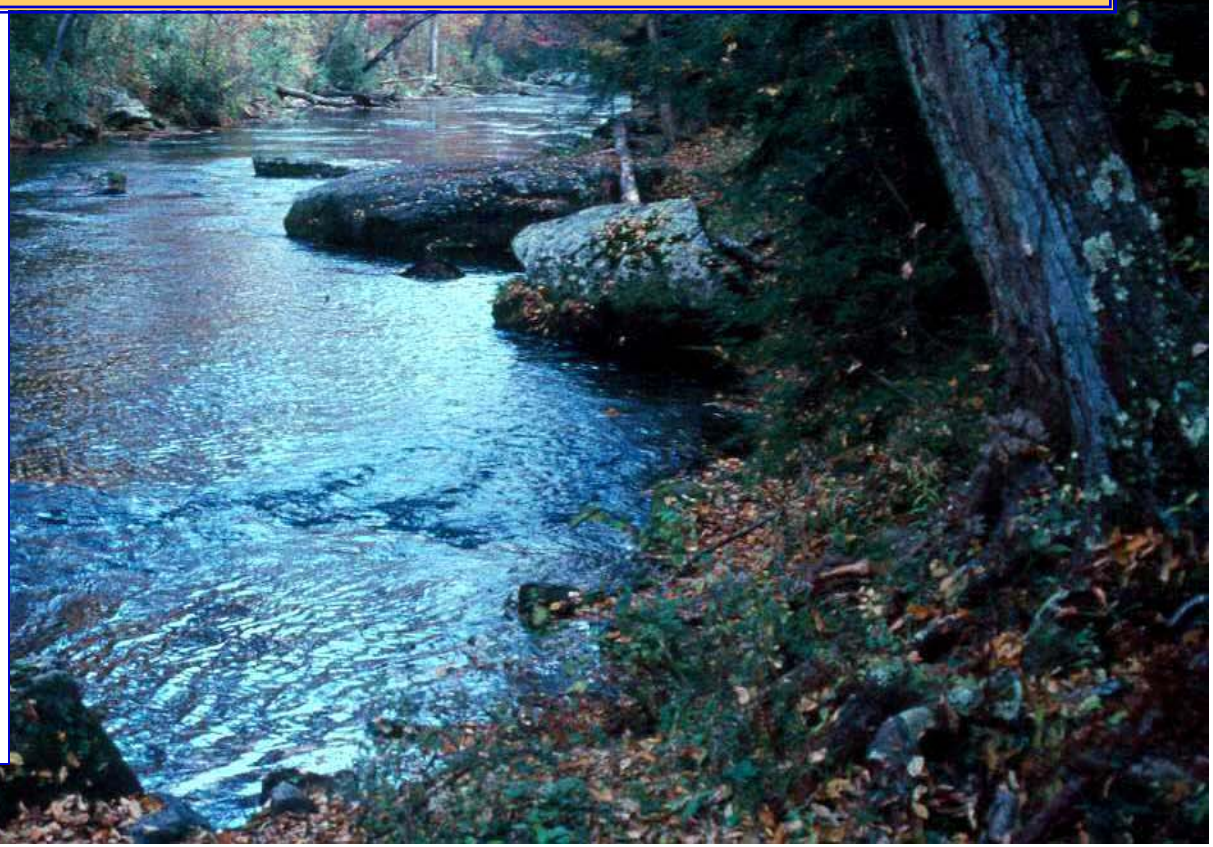
BALTIMORE COUNTY
MARYLAND

Department of Environmental Protection and Resource Management

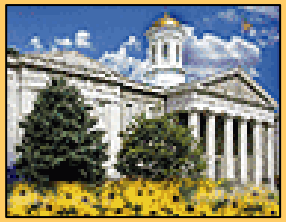


How Do We Measure Success?

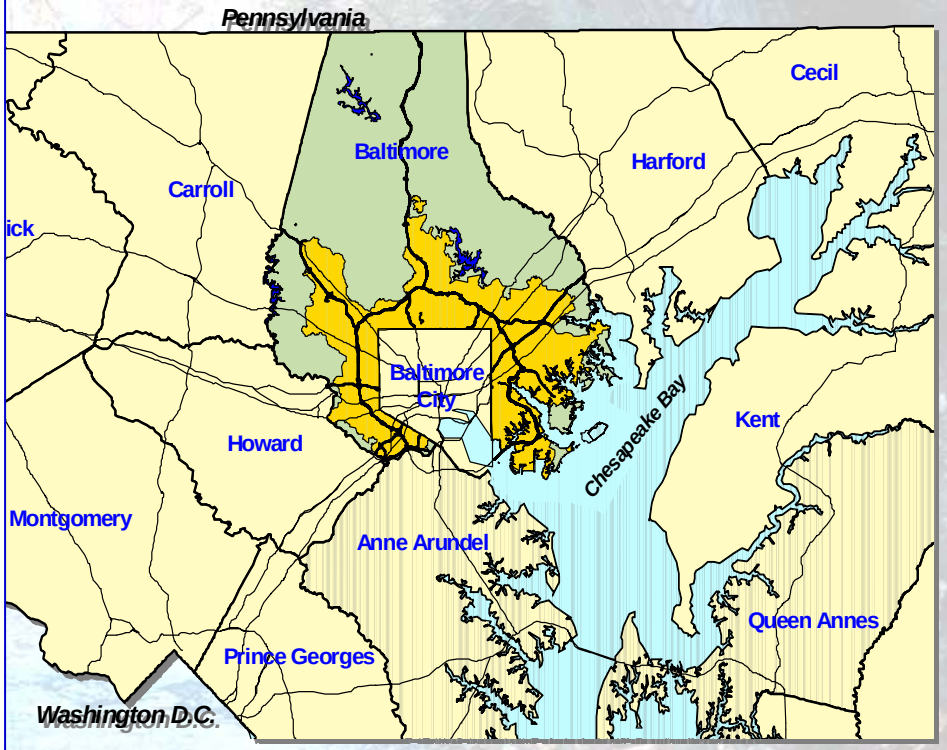
"The health of our waters is the principal measure of how we live on the land"

Luna B. Leopold

Baltimore County, MD
An Introduction

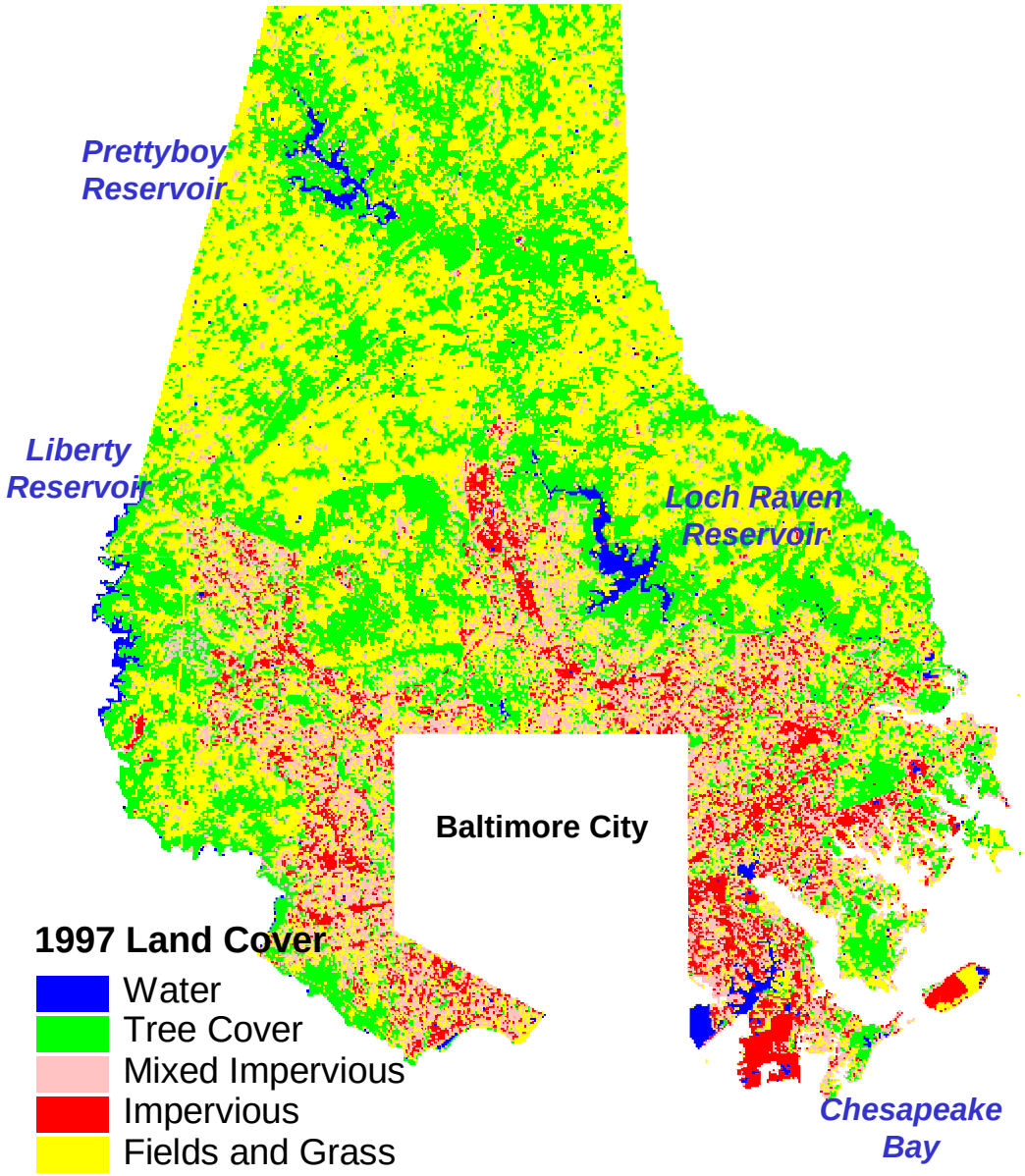


- Maryland's 3rd largest County:
  - 610 square miles
  - 780,000 people (2005 est.)
- No Incorporated Municipalities:
  - Independent of Baltimore City since 1851
- Population Density:
  - 1,260/sq.mi. (v. 542 for MD)
- Population Growth Rate:
  - 1% per year 1970-2000-2030
- Management:
  - Fourth best-managed of 40 largest urban counties in the US (*Governing*, 2002)

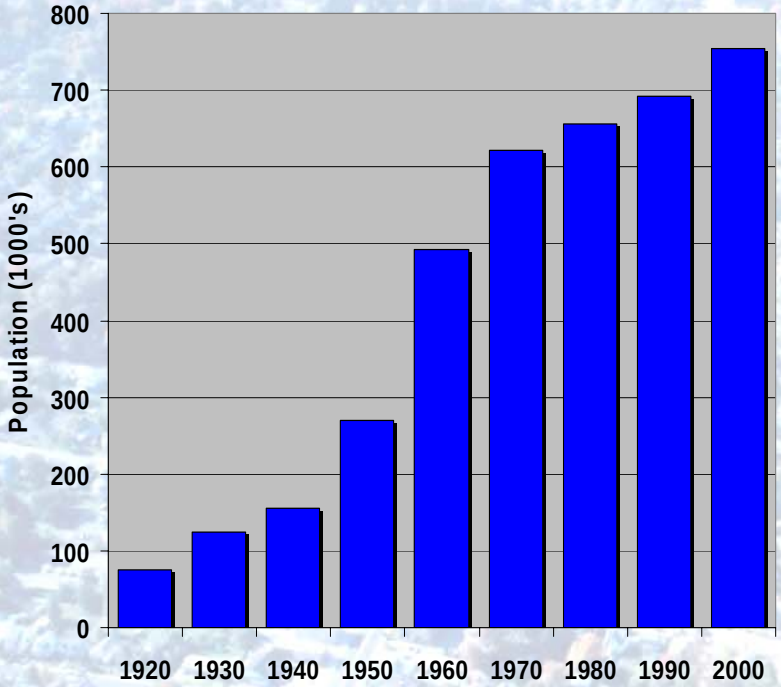


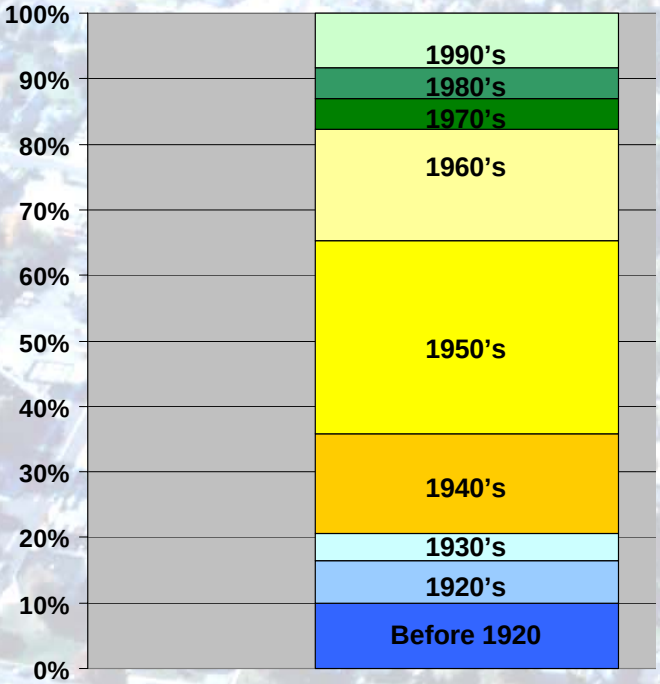
"the land of pleasant living"

Baltimore County Land Cover and Resources



- 82% Piedmont province, 18% Coastal Plain
- 1/3 each urban, agriculture, forest land cover
- >220 miles of Chesapeake Bay shoreline
- 2,100+ miles of freshwater streams and tidal rivers
- 63% of 3 City-owned reservoir watersheds in County
- 50% of streams drain to reservoirs
- reservoirs serve 90% of County and 1.8 million in Baltimore region





Population Growth

- 62% in just 30 years: 1940 -1970
- 36% - post - 1950's
  29% - 1950's
  35% - pre - 1950

Growth Management Milestones

- 1945 First Zoning Regulations
- 1963 Plan for the Valleys
- 1967 Urban-Rural Demarcation Line
- 1975 Resource Conservation Zoning
- 1979 Designated Growth Areas
- 1972, 1975, 1979, 1989, 2000 Master Plans

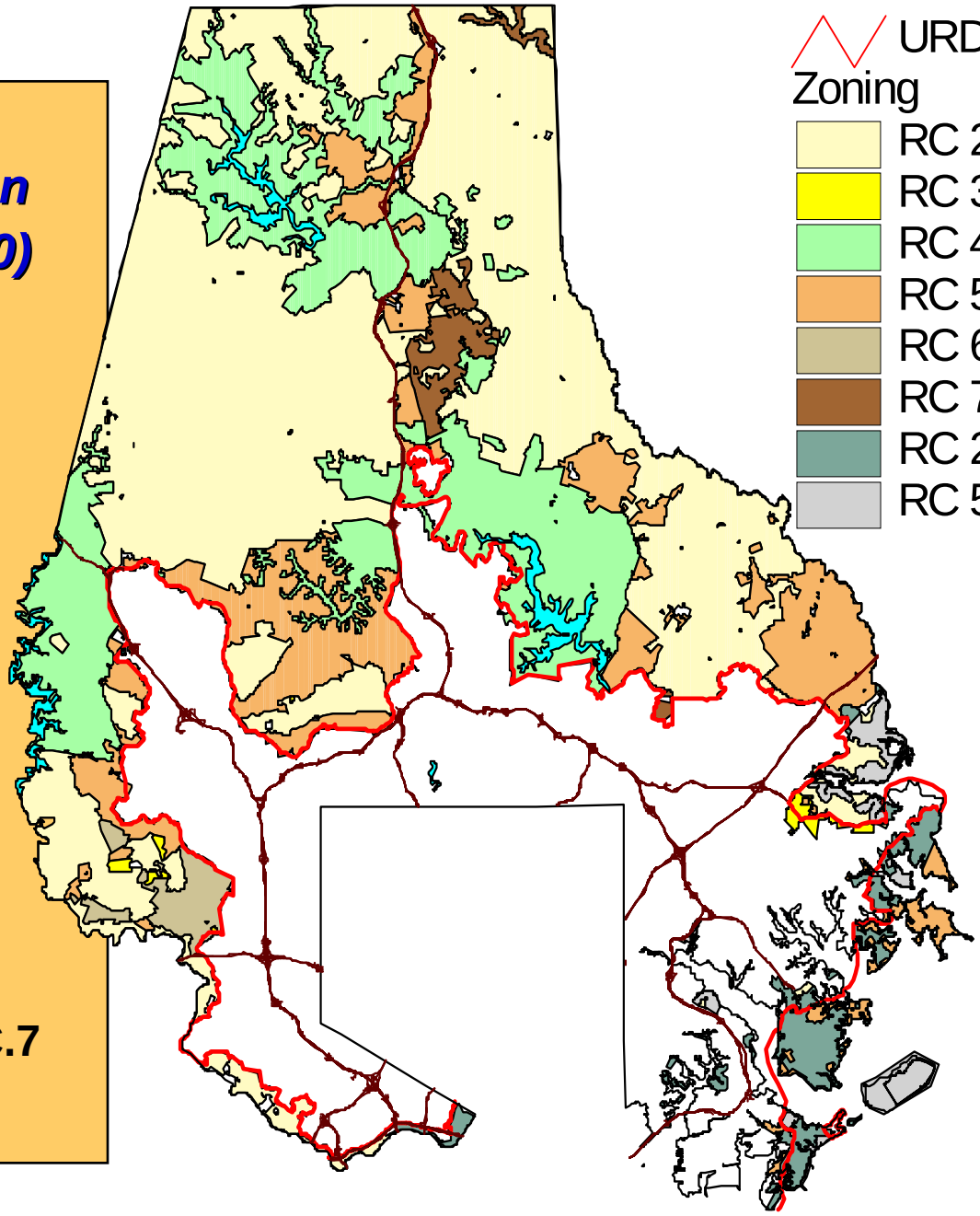
90% of the County's year 2000 population lives inside the URDL, on 1/3 of the land

Resource Conservation Zoning (2000)

R.C. Zones first established in 1975

Quadrennial Comprehensive Zoning Map Process (CZMP)

New Zones:
2001 - R.C.6, R.C.7
2004 - R.C.8



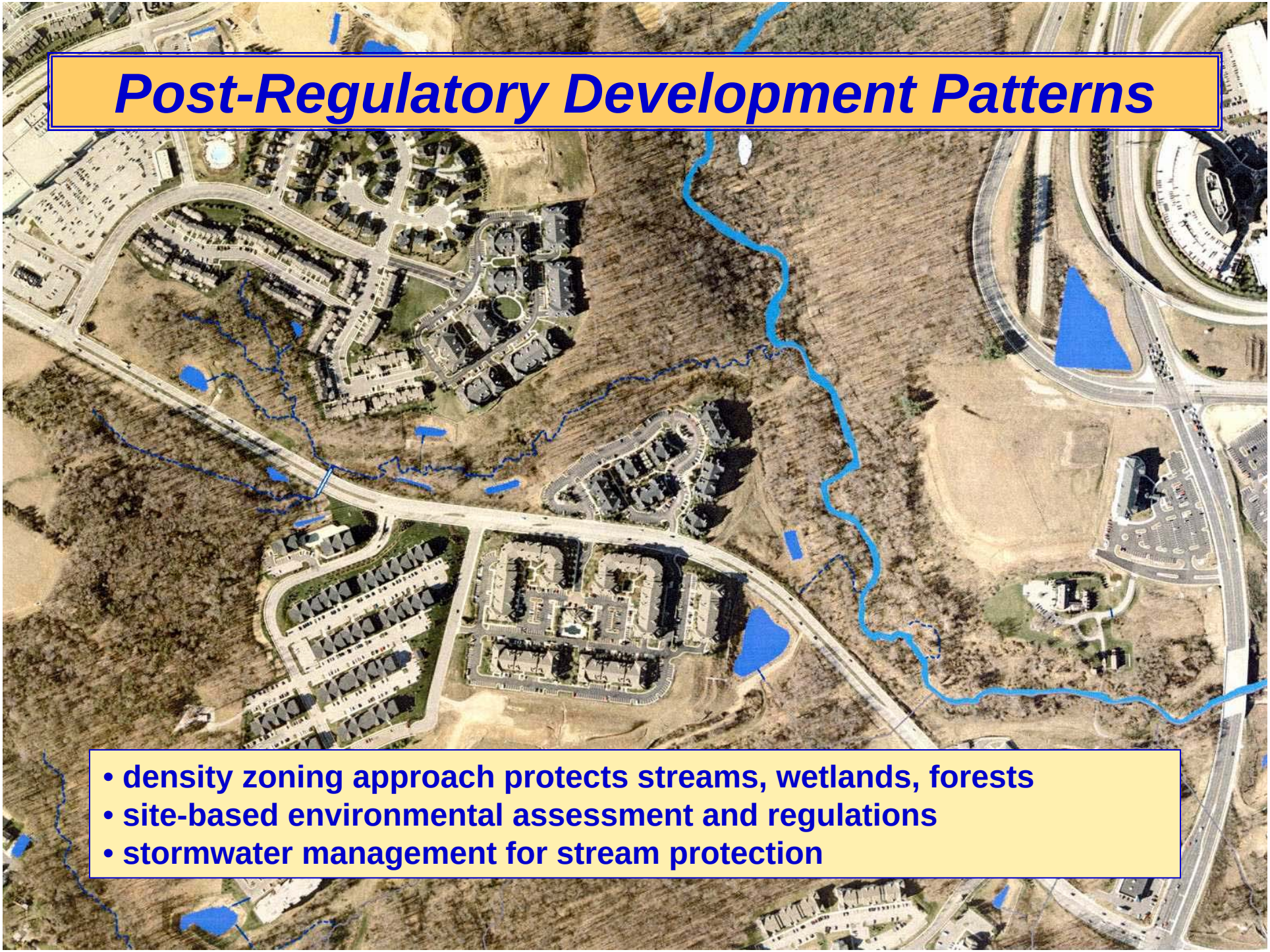
Urban Baltimore County

Rural Baltimore County

Pre-Regulatory Development Patterns

- 87% of year 2000 population arrived by 1980, before env. regulations
- minimum lot size zoning approach
- use of engineering to overcome site limitations
- no stormwater management or protection of streams, wetlands, forests

Post-Regulatory Development Patterns



- density zoning approach protects streams, wetlands, forests
- site-based environmental assessment and regulations
- stormwater management for stream protection

Urban Stream Problems

Problems and Challenges

- The cumulative effect of human disturbances is threatening the sustainability of the natural environment.
- Consequences include loss of ecosystem services and socio-economic values.
- Federal and state mandates now require local governments to address deleterious management practices including impacts of historic land use change.
- Local governments have traditionally not understood nor been adequately prepared to use science-based management.
- Restoration is expensive and practitioners need to justify projects to elected officials.

Environmental Program Drivers

National environmental policy and regulatory programs:

- Clean Water Act (NPDES MS4, TMDLs)
- Coastal Zone Management Act (Sec. 6217)

Cooperative ecosystem management commitments:

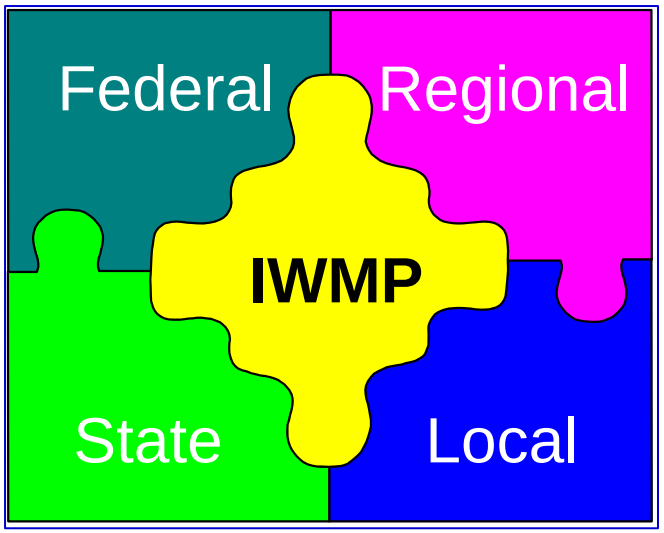
- Chesapeake Bay Program (nutrient strategies, habitat goals, sound land use, land preservation)
- Reservoir Watershed Management Agreement (regional)

State regulatory mandates:

- Chesapeake Bay Critical Areas
- stormwater management
- non-tidal wetlands
- sediment/erosion control
- forest conservation

Local initiatives:

- stream buffer regulations
- stream restoration
- forest sustainability
- Green Schools



Baltimore County Integrated Watershed Management Program

1997 Gold Award Recipient

- *Growth Management and Land Preservation*
- *Resource Protection (Regulation)*
- *Environmental Restoration*
- *Facility Maintenance*
- *Assessment, Monitoring, and Research*
- *Planning and Program Coordination*
- *Education and Citizen Participation*

Local Governments:

"closest to the people"

Cost of County provision of services for FY 2006:

- $1.45 billion Operating Budget (General Fund portion)
- $ .72 billion Special Fund
- $ .64 billion Capital Improvement Program
- 24,781 employees

DEPRM FY 2006 Budget:

- $ 6.4 million (0.44% of County total)
- $ 18.7 million (2.90% of County total)
- 116 employees (0.47% of County total)

Working with Federal Agencies

- "frequent flyer" for stream restoration and stormwater BMPs under MDE cost-share programs
- collaborator with EPA ORD on study of denitrification effect of stream restoration (Joe Williams & Paul Mayer et al.)
- participant in EPA-funded project by Trust for Public Land on source water protection (Prettyboy Reservoir Watershed)
- collaborator with State of Maryland and counties for EPA-funded Gunpowder River basin study
- potential "client" for local pilot for EPA Regional Environmental Vulnerability Assessment (ReVA)
- one of three county pilots USDA Forest Service for forest sustainability for *Linking Communities to the Montreal Process Criteria & Indicators* project

Local Environmental Management Questions - Examples

- How much watershed forest cover and/or riparian forest cover do we need to maintain channel stability, stream diversity, and protect drinking water? What are the critical functional thresholds?
- What is the role of stream restoration for denitrification? How can we measure the multiple benefits of restoration practices?
- How effective are our restoration practices? Which are the best combinations of restoration projects and other management practices?
- What is the cost/benefit of protection v. restoration? Are we spending our taxpayers' money wisely?

The Importance of Federal Environmental Research to Local Governments

- local governments have the responsibility, through legal mandates, to protect and restore ecosystem function
- local governments typically lack the capacity for conducting environmental research, including time for research and staff with technical expertise
- federal agencies are better able to synthesize complex, multi-dimensional, and spatially extensive data
- local funds are limited and there is intense competition for spending the tax dollar
- elected officials favor spending limited funds on programs they perceive to have the most tangible benefits for citizens in the short term

Stream Restoration Objectives

- re-establish “equilibrium” channel pattern, profile, and cross-section
- convey base flows, bankfull flows, and flood flows
- reduce streambank erosion and channel incision
- improve water quality and control stormwater
- provide in-stream and riparian habitat
- protect in-stream infrastructure (sewers, bridges, and culverts)
- protect private property and structures
- improve community aesthetics

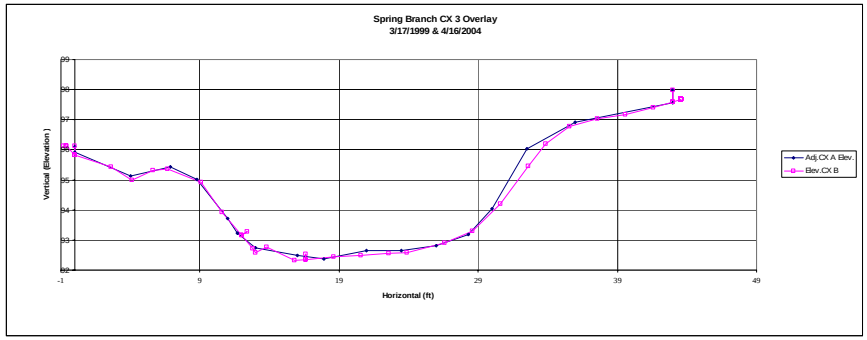
Baltimore County Stream Restoration Progress

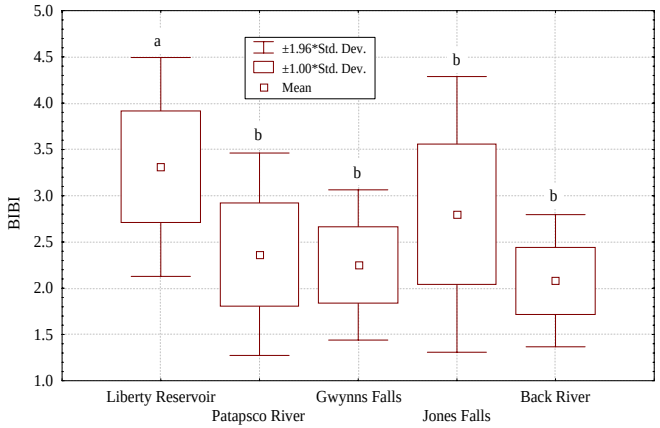
Status of projects completed or in design or construction at the end of 2003:

- 700 stream miles assessed for geomorphic stability (1/3 of streams)
- 42 projects completed
- 80,100 feet restored
- $22.9 million invested

Rosgen-based "natural channel design"

Spring Branch Restoration: $1.2 million per mile





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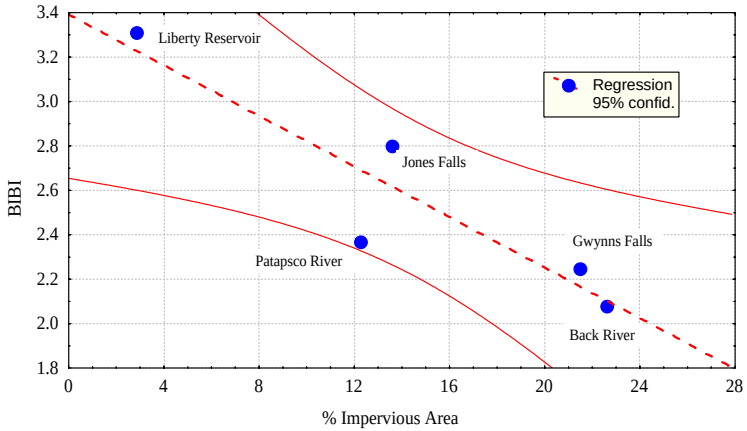

Stream Restoration Monitoring

Post-construction monitoring required for 2-5 years by Corps/MDE permits

Geomorphological Monitoring:

- cross-sections, longitudinal surveys
- observational structural monitoring (root wads, rock weirs, step pools)

Biological Monitoring:

- capital and reference site monitoring
- Benthic macros & fish assemblages

Spring Branch Monitoring:

- long-term NPDES monitoring site
- chemical, geomorphological, and biological monitoring

Minebank Run Stream Restoration Project at Loch Raven High School - Before

Minebank Run Stream Restoration Project at Loch Raven High School - After